WHAT IS CLAIME IS:

1. A semiconductor device comprising:

a semiconductor substrate;

gate insulators formed on said substrate, and

gate electrodes formed on said gate insulators,

said gate insulators which are mainly composed of a material selected from titanium oxide, zirconium oxide and hafnium oxide and in which compression strain is produced, and said semiconductor device equipped with MOS transistors.

2. A semiconductor device comprising:

a semiconductor substrate,

gate insulators formed on said substrate, and

gate electrodes formed on said gate insulators,

said gate insulators which are mainly composed of titanium oxide having a rutile crystal structure and in which compression strain is produced, and said semiconductor device equipped with MOS transistors.

3. A semiconductor device comprising:

a semiconductor substrate,

gate insulators formed on said substrate, and

gate electrodes formed on said gate insulators,

said gate insulators being mainly composed of titanium oxide having a rutile crystal structure, and said semiconductor device equipped with MOS transistors,

wherein the thermal expansion coefficient of the main composing material of said gate electrodes is greater than the linear expansion coefficient of said titanium oxide.

4. A semiconductor device comprising:

a semiconductor substrate;

gate insulators formed on said substrate, and

gate electrodes formed on said gate insulators,

said gate insulators which are mainly composed of titanium oxide having a rutile crystal structure and in which compression strain is produced while tensile strain is produced in the gate electrode, and said semiconductor device equipped with MOS transistors.

5. A semiconductor device according to claim 1, wherein said insulator comprises a film mainly composed of silicon oxide and an overlying film mainly composed of a material selected from titanium oxide, zirconium oxide and hafnium oxide.

6. A process for producing a semiconductor device comprising the steps of:

depositing titanium oxide having a rutile crystal structure on one principal surface of a semiconductor substrate to form gate insulators mainly composed of said rutile titanium oxide, and

forming gate electrode films on said gate insulators.

7. A process for producing a semiconductor

device comprising the steps of:

depositing titanium oxide on one main principal surface of a semiconductor substrate by chemical vapor deposition at 650°C or above to form gate insulators mainly composed of titanium oxide, and

forming gate electrode films on said gate insulators.

8. A process according to claim 5, wherein the said step of forming gate insulators comprises the steps of:

forming a film mainly composed of silicon oxide, and

forming thereon a film mainly composed of an oxide material having higher permittivity than said silicon oxide.

9. A semiconductor device comprising:

a semiconductor substrate, and

MOS transistors formed on said substrate and each having a gate insulator and a gate electrode formed on said gate insulator, wherein a first MOS transistor has a gate insulator mainly composed of a material selected from titanium oxide, zirconium oxide and hafnium oxide, and a second MOS transistor has a gate insulator containing silicon oxide in a high proportion.

10. A semiconductor device according to claim 9, wherein the first MOS transistor is a transistor used for calculations or memories, and the second MOS

transistor is a transistor used for I/O.

11. A semiconductor device comprising:

a semiconductor substrate,

gate insulators formed on said substrate, and

gate electrodes formed on said gate insulators,

said gate insulators which have a multilayered structure mainly composed of a material selected from titanium oxide, zirconium oxide and hafnium oxide and in which compression strain is produced, and said semiconductor device equipped with MOS transistors.

12. A semiconductor device equipped with MOS transistors having titanium oxide gate insulators interposed between a semiconductor substrate and gate electrodes, wherein the main crystal structure of said titanium oxide is anatase, and the state of strain of the channel region of said semiconductor substrate is tensile strain.

13. A semiconductor device according to claim 12, wherein a silicon oxide film or a titanium silicate film is disposed between said semiconductor substrate and said titanium oxide gate insulators.

14. A semiconductor device according to claim 12, wherein said gate electrodes have a phosphorus- or boron-added polycrystalline silicon film, and a silicon oxide film or a titanium silicate film is interposed between said gate electrodes and said titanium oxide gate insulators.

15. A semiconductor device according to claim 12, wherein said gate electrodes comprise a tungsten film, a molybdenum film, a tungsten nitride film, a tungsten boride film, a tungsten silicide film, or a laminate thereof.

16. A semiconductor device according to claim 12, wherein said gate electrodes comprise a ruthenium oxide film which is in contact with said titanium oxide gate insulator.